

A redescription of *Lerista karlschmidti* (Marx & Hosmer, 1959) (Reptilia: Scincidae) from the Northern Territory and removal of this species from the Queensland faunal list by rejecting its type locality

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ABSTRACT

The current species concept for *Lerista karlschmidti* encompasses two widely disjunct populations, one in Queensland and the other in the Northern Territory. The two populations cannot be differentiated morphologically and genetic analysis is currently not possible since the original Queensland specimens (the type series) are likely to be formalin-fixed. The species has not been found in Queensland since its description, despite targeted searches by competent field herpetologists. Herein, we re-evaluate the collection data associated with the type specimens and also assess aspects of head scalation that are almost unique to this species. We conclude that *L. karlschmidti* is an endemic Northern Territory species, that the type locality of Woodstock, Queensland, is in error and that the species should be removed from the Queensland faunal list.

□ *Lerista*, Queensland, *L. karlschmidti*, Northern Territory, species.

Lerista karlschmidti (= *Rhodona karlschmidti* Marx and Hosmer, 1959) was described from three specimens purportedly collected from Woodstock in north-eastern Queensland (19° 36' S 146° 50' E). It has not been seen in Queensland since, but populations currently assigned to this species also occur in the Northern Territory (see Figure 1).

In a recent review, we explored the history of the Queensland specimens and examined and compared the type series with specimens from the Northern Territory (see Couper & Amey 2009). We found no reason to doubt the collection data associated with the type series as it was supported by interviews with the late William (Bill) Hosmer (co-author of the type description) and Alex Johnson, the

collector's son. Further, we found the type series to be composite with one paratype (FMNH17741) assignable to *L. cinerea* Greer, McDonald & Lawrie, 1983 (cited as *L. cf. storri* Greer, McDonald & Lawrie, 1983, in Couper & Amey, 2009; see Couper *et al.* 2016), a narrowly endemic Queensland species occurring in close proximity to Woodstock. Despite these facts supporting a Woodstock origin for the remaining two specimens, the possibility that a transcription error or some other problem occurred with this material cannot be excluded. This would explain why repeated attempts to find this species in Queensland have failed. The most recent of these was conducted in association with a three year Australian Biological Resources Study grant (Australian Government Department



FIG 1. Map showing the known distribution of *Lerista karlschmidti* in the Northern Territory (yellow circles) and the purported type locality of Woodstock, Queensland (larger circle).

of the Environment and Energy) to survey *Lerista* species found in vine thicket communities in north Queensland (Couper *et al.* 2016).

Consequently, it is now timely to re-examine the question of a Queensland origin for the type specimens. In order to carry this out, one must consider the data associated with the type series and combine this with the information obtained from interviews with Bill Hosmer and Alex Johnson. The morphological distinctiveness of the species is also an important consideration. As the type material is likely to be formalin-fixed, a genetic comparison of it with the Northern Territory population is unfortunately not currently a feasible option.

The type data, as reported by Marx and Hosmer (1959), was previously taken on face value. However, the collection dates associated with each of the three specimens provide a useful clue when considered in conjunction with Bill Hosmer's recollection of being present when a specimen was found in Arnold Johnson's garden within the town of Woodstock (Couper & Amey 2009). The holotype (FNMH97957) and a conspecific paratype (FNMH97958) were both collected in 1952. The other paratype (FNMH97741) was collected in 1954. It is this latter specimen that is now referable to *L. cinerea* (see Couper *et al.* 2016), a species which is narrowly endemic to the Charters Towers

region of north-east Queensland. It seems likely that this is the specimen captured in Arnold Johnson's garden. Additionally, there are two characters seen in the 1952 specimens and the Northern Territory *L. karlschmidti* that are comparatively rare in other *Lerista* species: the fusion of the second loreal with the prefrontal (observed in 9 of the 93 described species) and the loss of supraciliaries (observed in 8 of the 93 species). To find both states in a single species is rare indeed (3 of the 93 species, the other two being *Lerista labialis* Storr, 1971, widely distributed in Australia, including in far-western Queensland, and *Lerista simillima* Storr, 1984 from the south Kimberley region of Western Australia). It should be noted that some of these values were derived from species descriptions in the literature rather than from direct examination of specimens. Further, the values presented may not be absolute as there are inconsistencies in the terminology used by different researchers to describe head scalation. Nonetheless, they provide a measure of the rarity of these characters within the genus. For two widely disjunct populations, already convergent in all other characters measured, the occurrence of this rare combination of character states seems improbable, to say the least. In a previous publication (Couper & Amey 2009) we suggested that the Northern Territory and Queensland *L. karlschmidti* populations were unlikely to be conspecific. However, on reviewing the occurrence of these scale characters across all *Lerista* species, we now consider it equally unlikely that these specimens represent two different, yet highly convergent, populations.

In the absence of any Queensland specimens of *Lerista karlschmidti* being recorded in the 65 years since it was first described, despite considerable search effort, it is our belief that *L. karlschmidti* should now be regarded as an endemic Northern Territory species. Maintaining *L. karlschmidti* as a species with two widely disjunct populations fails to recognise the high levels of endemicity and low vagility seen in these lizards (Amey & Edwards 2017). Also, it is a glaring anomaly if one considers the distributions of other *Lerista* spp. (93

species). Upon considering the above points, we believe there are adequate grounds for removing *L. karlschmidti* from the Queensland faunal list. It is likely that Bill Hosmer did witness the collection of FMNH97741 from a garden in Woodstock in 1954 but it does not follow that the two 1952 specimens he received from Arnold Johnson were necessarily from the same locality. The Woodstock locality given for these specimens (FNMH97957 and FNMH97958) probably stems from a failure by Marx and Hosmer to recognise them as different from the Queensland specimen. In overall morphology *L. karlschmidti* is generally similar to that of *L. cinerea*, with only finer details of head scalation separating the two species. By considering all three specimens as conspecific, it made sense to these authors that that they all came from Woodstock. At the time, neither the huge diversity within *Lerista*, nor the subtlety of the characters delineating the species, could be conceived. There were only 25 recognised species now assignable to *Lerista* described, with only seven of these occurring in Queensland. In 1963, things remained much the same with Worrell, in his classic work *Reptiles of Australia* (Worrell 1963), recognising only 24 species and one subspecies (all contained within *Ablepharus* and *Rhodona*). That Arnold Johnson had not visited the Northern Territory prior to the collection of the type series by no means precludes the possibility that they were given to him by a third party who had.

Herein, we redescribe *L. karlschmidti* from a larger series of specimens and restrict this species to the Northern Territory.

MATERIALS AND METHODS

Morphology. All body measurements were taken using Mitutoyo electronic callipers (± 0.01 mm). Scales were counted on the right side only of specimens examined. The total number of enlarged nuchals is given, rather than the number of pairs. Only original tails (assessed by eye) were included in the morphometric analysis. Abbreviations and definitions of body measurements are detailed in Table 1. Preocular is here defined as the scale anterior to the eye

margin contacting a loreal and the second supralabial; presubocular is the scale below the preocular, contacting the eye margin and the second and third supralabials; postoculars are the scales at the posterior margin of the eye and lying between the pretemporal and postsubocular and contacting the dorsal edge of the fourth supralabial; postsuboculars contact the postocular and the third and fourth supralabials; the pretemporal contacts the primary temporal, the parietal and the last supraocular; paravertebral count is the number of scales along the dorsum between the parietals and the posterior edge of the hindlimb, including any enlarged nuchals; supradigitals are the enlarged scales along the dorsal margin of the digit from the claw to the join with the pes. For the colour pattern description, dorsal row one refers to the paravertebrals. All other definitions follow Lillywhite (2008). Where ranges are given, they are followed by the mean \pm the standard deviation.

Abbreviations for measurements used and their definitions.

- EE Eye-ear (distance from posterior margin of eye to anterior margin of ear).
- FN Frontonasal length (anterior point between nasals to posterior margin bordering rostral as a percentage of its width).
- HL Head length (tip of snout to posterior margin of parietals)
- HW Head width (widest point).
- IW Maximum interparietal width as a percentage of its length.
- L2 Hindlimb length (groin to tip of claw).
- MV Midventral scale width (widest point of a ventral scale approximately midbody) as a percentage of paravertebral scale width (widest point of a dorsal scale approximately midbody).
- MW Midbody width (width of body measured at approximately midpoint).
- NaL Naris length (as a percentage of nasal scale length).
- NC Nasal contact (length of contact between



FIG 2. The holotype of *Rhodona karlschmidti*, FMNH 97957.

- two nasal scales as a percentage of their length).
- PL Postmental length as a percentage of its width.
- E Supralabial-ear (distance from posterior edge of last supralabial to anterior margin of ear).
- SVL Snout-vent length.
- TL Tail length (vent to tip).

SYSTEMATICS

Lerista karlschmidti (Marx & Hosmer, 1959)

Rhodona karlschmidti Marx & Hosmer, 1959
Figs 2 & 3

Diagnosis. *Lerista karlschmidti* can be distinguished from all other *Lerista* by the combination of monostylar hindlimbs, two loreal scales, no forelimbs, no prefrontals and no supraciliaries.

Etymology. Named by Marx & Hosmer (1959) for Karl Patterson Schmidt (1897-1957), a prominent herpetologist based at the Field Museum of Natural History, Chicago.

Type Locality. "...collected at Woodstock, about 23 miles south of Townsville, north Queensland, Australia..." (from Marx & Hosmer, 1959). For reasons outlined in the present account, this locality is concluded to be erroneous.

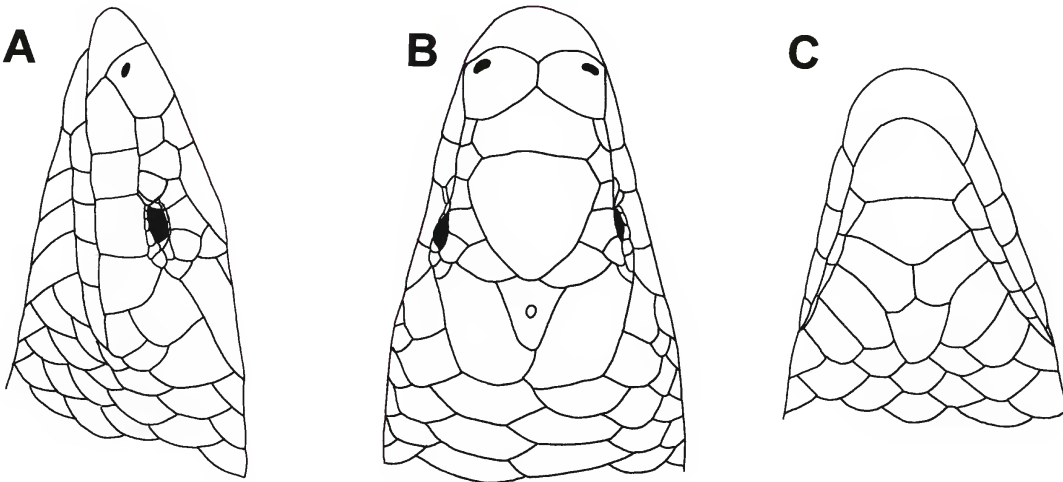


FIG 3. Scale arrangement of *Lerista karlschmidti* AMR88582, A, lateral view; B, dorsal view; C, ventral view.

Material examined. Abbreviations: AM = Australian Museum, Sydney, FMNH = Field Museum of Natural History, Chicago, NT = Northern Territory, NTM = Northern Territory Museum and Art Gallery, Darwin, QM = Queensland Museum, Brisbane. All coordinates use the datum GDA94.

Type material. FMNH97957 (Woodstock, 36 km S of Townsville, NEQ, 19° 36' S 146° 50' E [in error]; holotype), FMNH97958 (Woodstock, 36 km S of Townsville, NEQ, 19° 36' S 146° 50' E [in error]; paratype). The paratype believed to have been collected from Woodstock, Queensland (FMNH97741), and herein assigned to *L. cinerea*, is excluded from the material examined. This specimen is discussed and described in Couper & Amey (2009).

Other material examined. AMR88582 (Jabiluka Project Area, NT, 12° 33' S 132° 55' E, 8/08/1979), AMR88895 (Jabiluka Project Area, NT, 12° 33' S 132° 55' E, 17/09/1979), AMR97301 (Island Billabong, Jabiluka Project Area, NT, 12° 34' S 132° 53' E, 19/03/1981), NTMR 20995 (Goyder River area, Arnhem Land, NT, 12° 38' S 134° 49' E, 05/08/1990), NTMR6178 (Goyder River Crossing, Arnhem Land, NT, 12° 56' S 135° 02' E, 29/08/1978), NTMR10963 (South Alligator River Ranger Station, NT, 12° 41' S 132° 27' E, 16/09/1977), NTMR12426 (East Alligator River, Rangers Camp, NT, 12° 26' S 132° 57' E, 28/05/1983), NTMR12560 (Milingimbi Settlement, NT, 12° 06' 30" S 134° 55' E, 24/07/1984), NTMR12608 (Nabarlek, NT, 12° 19' S 133° 19' E, Oct, 1982), NTMR13884 (Nourlangie Rock, Kakadu National Park, NT, 12° 43' S 132° 33' E), NTMR16176 (Liverpool River Crossing, Arnhem Land, NT, 12° 22' S 134° 07' E, 18/07/1989), NTMR18481-18483 (Opium Creek Station, NT, 12° 33' S 131° 47' E, 16/02/1997), NTMR19012 (Malay Bay, Cape Cockburn, NT, 11° 21' S 132° 52' E, 19/06/1993), NTMR19044 (Guluwuru Island, NT, 11° 30' 00" S 136° 26' 12" E, 28/07/1993), NTMR19054 (Wessel Islands, NT, 11° 29' 18" S 136° 25' 48" E, 27/07/1993), NTMR19062 (Guluwuru Island, NT, 11° 30' S 136° 26' 12" E, 27/07/1993), NTMR19143 (Red Point, Marchinbar Island, NT, 11° 16' 18" S 136° 35' 54" E, 13/07/1993), NTMR20367 (Jabiluka Project Area, NT, 12° 33' S 132° 55' E, 20/06/1992), NTMR20996 (Goyder River Area, Arnhem Land, NT, 12° 38' S 134° 49' E, 5/08/1990), NTMR21521 (Jabiluka Project Area, NT, 12° 33' 30" S 132° 55' 00" E, 26/05/1992), NTMR22668 (Katherine River, Slesbeck Area, NT, 13° 41' 31" S 133° 02' 22" E, 7/07/1996), NTMR24278 (West Alligator River, 3.3 km E, Arnhem Highway, NT, 12° 47' 08" S 132° 12' 11" E, 8/12/1998), QMJ82492-82495 (Maningrida, NT, 12° 2' 33" S 134° 14' E, Aug, 2005), QMJ84188 (Maningrida airstrip, NT, 12° 05' 42" S 134° 14' 16" E, 8/8/2006).

Description. SVL = 41.8–70.4 mm (n = 29, 60 ± 7 mm), HL = 7–10% SVL (n = 29, 8 ± 1%), HW = 56–71% HL (n = 28, 66 ± 4%), SE = 20–32% HL (n = 26, 25 ± 3%), eyelid free, EE = 47–56% HL

(n = 26, 51 ± 2%), ear minute, MW 5–8% SVL (n = 23, 6 ± 1%), L2 = 2–6% SVL (n = 29, 4 ± 1%), TL = 85–92% SVL (n = 2). Hindlimb usually with 1 clawed toe (n = 19) or reduced to stump (n = 10).

Midbody scale rows 16–20 (n = 29, mode = 16), NC = 17–48% (n = 29, 33 ± 7%), NaL = 13–26% (n = 26, 20 ± 3%), FN = 39–62% (n = 29, 54 ± 6%), three supraoculars, supraciliaries absent. Frontal contacts interparietal, frontoparietal, first and second supraoculars, 2nd loreal and frontonasal. Frontoparietals free, IW = 77–143% (96 ± 14%), two loreals, preocular single, presubocular single, 2–5 palpebrals (n = 26, mode = 4), postoculars 1–2 (n = 29, mode = 2), postsuboculars 1–2 (n = 29, mode = 2), five supralabials, third supralabial entering eye, postsupralabial single, usually five infralabials (6 in QMJ84188), usually two infralabials contacting postmental (one in NTMR18481, 19044, 19054, 19062, 20367, 1 and 2 in NTMR24278), one pretemporal, primary temporal contacts fourth and fifth supralabials, pretemporal, parietal and secondary temporals (also contacts postocular in 50% of specimens examined, n = 12), PL = 43–72% (n = 29, 58 ± 7%), three rows of enlarged chin shields, 2–6 nuchals (n = 29, mode = 3), 93–110 paravertebrals (n = 29, mode = 104), MV = 61–93% (n = 22, 77 ± 9%), 2–4 enlarged preanals (n = 26, mode = 2); hindlimb 2–8 body scales in length (n = 25, mode = 6), 3–5 subdigital lamellae under the longest toe (n = 18, mode = 3), 2–4 supradigitals on longest toe (n = 18, mode = 3), 82–86 subcaudals (n = 2).

Colour pattern. Tan to pale brown above, each scale with fine darker speckling and bearing a dark brown medial streak; strongest on scale rows one to four. In most specimens these form eight prominent, broken or continuous longitudinal stripes, which are sometimes widest on scale rows three and four. The stripes become increasing broken and obscure on the mid to lower flanks but in some individuals longitudinally aligned rows of spots are still evident on the ventral surface. There is no sharp demarcation between dorsal and ventral surfaces. Body stripes extend to original tail and become more obscure distally but are lost on regrown tails which have a more speckled

appearance. A sudden break in pattern clearly defines the point of tail loss. Ventral surfaces off-white, immaculate or with faint speckling or some indication of longitudinally aligned streaks. Underside of original tail also streaked. Dorsal head shields with irregular dark mottling. A smudge of darker pigment present on side of face, encompassing the nasal and loreals and extending through the eye to the temporal scales. Infralabials and chin shields diffusely speckled with darker pigment.

Distribution. (See Figure 1) This species is confined to the central and north-eastern parts of Arnhem Land in the Northern Territory (Horner 1992; Atlas of Living Australia (<http://www.ala.org.au> accessed 11 Aug, 2017).

Habitat. A fossorial species found in sandy substrates in tropical woodlands (Horner 1992; Atlas of Living Australia (<http://www.ala.org.au>, accessed 11 Aug, 2017).

Comparison with similar species. *Lerista karlschmidti* can only be confused with *L. carpentariae* Greer, 1983, *L. cinerea*, *L. hobsoni* Amey, Couper & Worthington Wilmer, 2016 (in Couper *et al.* 2016), *L. storri*, *L. stylis* (Mitchell 1955), *L. vanderduysi* Amey, Couper & Worthington Wilmer, 2016 (in Couper *et al.* 2016) or *L. vittata* Greer, McDonald & Lawrie, 1983, all of which are species with similar patterns and that also have free frontoparietal scales and no forelimbs. Unlike *L. karlschmidti*, these species possess supraciliary scales.

REMARKS

Our primary goal in reassessing *L. karlschmidti* was to determine whether there is justification for leaving this species on the Queensland faunal list. To do so and thereby maintain the long standing status quo of a species with populations in the Northern Territory and Queensland has land management implications. This is particularly so for Queensland as this population has not been seen there for more than 60 years and, under state legislation, would warrant the highest conservation listing. If, as we believe, the species does not occur in Queensland, it is counter-productive to continue searching for it. Restricting it to the Northern Territory allows

limited conservation resources to be allocated elsewhere. Further, it has long been postulated that, given the accepted distributions of the Northern Territory and Queensland populations, they were likely to be genetically distinct and represent different species. This work assigns the name to the Northern Territory population. The type locality as stated in the original description is in error. Unfortunately, where the holotype was actually collected remains unknown but, based on current knowledge, is best defined as the northern part of the Northern Territory.

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